

Interactive comment on “Towards a webcam-based snow cover monitoring network: methodology and evaluation” by Céline Portenier et al.

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The paper entitled “Towards a webcam-based snow cover monitoring network: methodology and evaluation” by C. Portenier et al. presents an innovative and promising approach to exploit available webcam imagery for snow cover (SC) mapping in Switzerland. This is a first important step towards the combination of different sensors and platforms to monitor snow parameters over large regions with high temporal and spatial resolution. However, there are three main points I would like to see clarified and complemented before I can recommend the paper for publication:

1. Snow cover classification

C1

Two quite simple methods are applied to classify snow covered areas in the webcam imagery (Salvatori et al. 2011 & Härer et al. 2016). This part is not complete in my opinion. The method by Härer et al. 2016 should be described in more detail, now there is just a reference to this paper. As the authors state themselves in the discussion and conclusion, there is a big potential for improvement concerning this point. As the snow cover classification is an essential part of the entire processing chain, I recommend to invest some more time to look at different other options. Federov et al. 2016 and Rufenacht et al. 2014 already tested more advanced classification methods. The authors have at least to test and discuss these options and justify why they select the other options. I also suggest to overwork Fig. 10 including the results from all classification algorithms so they get comparable visible in an example image. Now only one method is demonstrated and it is not clear which one.

2. Geolocation accuracy assessment

In my understanding the spatial resolution of the imagery and with it the achievable accuracy is very much dependent on the distance of the camera to the terrain. The spatial resolution in your imagery must vary a lot! You do not really address this point. In contrast, your results even suggest that the accuracies get better with distance (as this is the area close to the maintain ridges that you used to co-register the image to the DEM, Fig. 13). Here clarification is needed. I would be interested to read what the image resolutions ranges are for the different webcams and what problems the varying resolutions cause. How does the resolution problem relate to the accuracy values you calculate?

3. Conclusions

The conclusions are too brief in my opinion. Here I would like to read a bit more of an outlook. How does it go on? For what satellite products will it be applied? Is there the intention to go also to other countries with this method? Please extend the conclusions.

Detailed comments:

C2

P2L17: I would be careful to talk about very high spatial resolution monitoring. Only the regions close by the camera are high spatial resolution (0.1 – 2 m). Further away it gets much coarser. Maybe you can define what you understand by very high spatio-temporal scales.

P2L19: You could be a bit more precise here, when there is fog there will be no information. What types of clouds will still be OK as also the contrast will be lowered by high clouds. I see the big benefit of the method for the evaluation of satellite products not only for complementation maybe you can add that.

P3Fig1: Please be careful about the publication of swisstopo data. Do you have all necessary rights? If so you should have a specific contract number from swisstopo which allows you to publish it.

P3L13: Only 57% of all cameras fulfill your conditions. Could you please explain a bit more here why? Are there options to increase that ration?

P4L6: The current resolution of swissimage is now 10 cm in the lowlands and 25 cm in the Alps

P5L7: How do you estimate the accuracy of the location estimation?

P9L22: why do cameras change their orientation? How often does that happen? Please explain

P11L32: How are “bad images” detected and eliminated? Is it done manually? If yes, would there be options to automatically detect “bad images”. This is an important point as there will be many images that should be removed in long timelines. I would like to see some more details on this point.

P12Fig9: Here you choose a fully snow-covered scene as example. In my opinion it would be of much more interest for the readers to see this demonstration on a partially snow covered scene. Could you change that?

C3

P14L10: Here you state that the best accuracy is close to the mountain ridge. But these are the regions with low spatial resolution. How accurate are the other points (see my main point N°2).

P14L14: here you state “residuals generally decrease with the distance to the web-cam”. From my understanding they should increase in that direction as it is much more difficult to find and set GCP's far away on lower resolution imagery. Please clarify.

P16L24: Please explain a bit more what RANSAC is and how you apply it.

References:

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C4